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ABSTRACT

The observation of 18 hours of videotapes of 44 eighth grade boys and girls working in same-sex and mixed-pair groups with MYRESNAK (A Danish variation of LOGO) mathematics software indicated gender-specific differences in cooperation and work style. These differences are explained in terms of gender-specific socialization practices and are interpreted from the perspective of a theoretical paradigm that includes the kinesthetic way of knowing, the emotive way of knowing, and the symbolic way of knowing. (GL)

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GIRLS AND COMPUTERS
- a world of difference?

Revised edition of paper prepared for The Third GASAT *) Conference, Kingston, Great Britain, April 1985.

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"Maybe it should be turned more," commented Susan. "Yes - this way?" said Lise, "it looks more right, don't you think?" Susan looked intensely at the screen: " ... why don't we try it?" "OK," said Lise, "you type it."

"They have to be 90°," said Lars. "No, each is 60°," stated Peter. Lars started keying a 90° turning. "I told you each is 60°," said Peter, pushing him aside, taking over the keyboard.

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<u>A world of difference</u>.

The differences are striking in the examples. The girls tend to orient themselves towards each other. The human relation seems equally - or more important - than the object they are working with. They seem to operate within a we-circle, and the cooperation is predominantly collective. The boys apparently work more individually, and orient themselves primarily towards the object, and secondarily, but also essentially, towards each other, though with attitudes, which are different from those of the girls. The boys also cooperate, but the dominant tendency is towards an individual performance, often with what we have termed an element of competition. [1)]

The difference between the boys and the girls may be illustrated in the following way:

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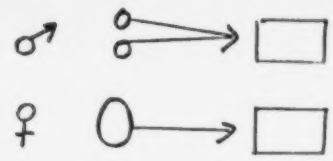

Whether or not the individual girl was capable of solving the posed problem, or knew the next step, she most often drew the other girl into a collective cooperation by using verbal suggestions like: "Don't you think ..... " or: "What if we turned it more?" Whether or not the other girl agreed, the suggestion was very often made the object of a discussion, in which mathematical concepts were used only tentatively. The girls tended to rely more on their perception, on what they felt looked right. And even if one of the girls thought herself right and argued for a specific turning, she would seldom move without getting some kind of consent from her partner.

The cooperation of the boys on the other hand appeared to consist of statements, which were not open suggestions, and mathematical concepts were used more frequently. This, though, does not necessarily imply a deeper understanding as the boys also tended to rely on what they felt looked right. "It should be turned 45° more", and if the other boy made no comments, it was turned. If he argued, it may - or may not - be turned as suggested: "A rectangle is 90°, stupid. I'll do it". Most often the decision seemed to depend on whose need for establishing individuality or demarcation from the other was the strongest.

<u>The data collection</u>.

The examples are the extremes, taken from videotapes, made in connection with a research project (Nielsen, Janni, 1984[A]). They illustrate a tendency in gender difference which may be observed on the tapes.

The data consists of 18 hours of videotapes with 44 pupils, 8th graders, approximately 14 years old. The pupils worked in pairs, making up:

20 girls = 10 pairs (mainly based on friendship)
18 boys = 9 " (also based on their own choice)
6 mixed = 3 " (put together by teacher).

Most pairs were filmed twice, in the initial stages, and towards the end of the experiment. The pupils worked for approximately 12 hours on APPLE II, with MYRESNAK (which may be described as a Danish variation of LOGO), used in Math education.

The Math classes were carried out at the Royal Danish School of Educational Studies, Copenhagen, where the pupils came for the session with their teachers (2 females and 1 male). The pupils had very little or no prior experience working with computers, though the boys seemed more at ease with the technique, whereas the girls in the beginning were more hesitant. None of the pupils were acquainted with either LOGO or its Danish variation MYRESNAK.

The analyses of the tapes have not yet been completed. However we decided it reasonable to present our present impressions - in view of a possible discussion.

But the following reservations ought to be made: though much research already published confirms our immediate findings, impressions may prove extremely limited once a detailed analysis is carried out. On the other hand, such an analysis may lead one to miss essential points. Generalizations as such of gender specific behaviour and attitudes often means overlooking individual differences, a certain blindness for variation. Among the girls and boys, respectively, significant individual differences do exist. There are girls, who primarily attempted to work goal oriented, trying to backtrace systematically, when something went wrong. Girls who did not seem to orient themselves primarily towards each other, though they were clearly at ease in each other's company. Just as there are boys, who did not really grasp what it is all about, who relied on trial and error, and by coincidence came across the correct solution - never understanding why.

This points to the necessity of carrying out individual

analysis in order to comprehend the individual differences and their relation to the generalized descriptions.

In our opinion, however, none of the boys seemed to rely primarily on the relationship to each other to the extent - or rather with the contents and value - which the girls seemed to express. And the girls did not seem quite as much at home with mathematical concepts as the boys.

We are also aware of the necessity of working with class specific analysis. Some of the variations observed in the videotapes among the pupils may be fruitfully understood within this frame. However, one has to enforce limitations (work reductionistic), and in this paper we have restricted ourselves to a gender approach, while trying to bear in mind the severe limitations this poses - but also the possibilities it provides.

A societal context.

The differences may be explained in terms of a gender specific socialization in a gender divided society. It shows itself on the labour market, where there is one labour domain for females, another for males.

In the sixties and seventies a great number of women of all ages entered the labour market within areas, which were in expansion: The social and the health sector, and the public administration. In many respects, these jobs represented a continuation of the tasks which women already occupied at home: caretaking, raising and educating children, creating order and maintaining an overall view of the activities taking place.

Although the labour market today shows other tendencies, with strong emphasis on technology, women and girls still orient themselves towards the mentioned traditional women's work. It is within these areas that young girls primarily wish to be educated.

Although the number of girls wanting a technical education is growing, they only represent a small portion of the population of young females, app. 10-15 %.

The picture in Denmark is so that

- women constitute 45 % of the working force
- women occupy 10 % of the leading jobs
- 6,1 % of the skilled workers are women
- 50,4 % of the unskilled workers are women
- 83 % of the working force within the office sector are women
- 85 % of the working force within the social and the health sector are women
- 55,8 % of students within humanities are women
- 16,4 % of students within the technical education are women (Nielsen, Janni, 1984 [8]).

It would appear that the gender specific socialization in a gender divided society creates girls, who primarily orient themselves towards social relations - and boys, who primarily orient themselves towards technical areas.

This may in turn be understood on the basis of the historical development of our culture, which involves gender specific myths. These myths represent two aspects of the human being, but they are ascribed to each their gender. A rational objective mind is ascribed to an autonomous male, making up the masculine myth. And an emotional, sensuous and subjective mind to a dependent female, making up the feminine myth. [2]) Though they are myths, they are also an essential dimension in the societal universe of interpretations and as such, no individual whether male or female may be untouched by, nor act independently of them. (Grønbæk, K., Nielsen, J., 1984). The socialization of the individual takes place within these frames. The psychological development of the two genders must be understood within these frames.

The result of the cultural development is the demarcation of the two genders to each their domain. We may speak of two different worlds, in which each gender has to gain their experience and acquire their knowledge of the world. As such it is possible to speak of gender specific cognition, or rather specific cognitive way, in which the girls will primarily grasp the world within a feminine universe of interpretations, and boys within a masculine universe of interpretations. [3])

Also science and technology may be viewed within this frame. The scientific and technological development must be understood, not only on the basis of economical and political factors, but also within a gender specific frame. Technology and science is the work of men, even today the scientist is a male, and it is primarily men's view upon reality and upon human beings, men's attitudes which have been the deciding factors in the development and application of science and technology.

A consequence of this development, and of the priority to rationality and objectivity - also being the characteristics of science - has not only been an exclusion of women from the scientific development, but also - as a tendency - an exclusion of the female universe of interpretation as an essential tool for describing, interpreting and understanding the reality. Hence also an illegitimation of the subject in science.

This is important for an understanding of, how the two genders relate to science, and for an understanding of science subjects in education. Math, computers and science are the products of males, developed and introduced within the masculine universe of interpretation. And as such, there is only limited space for girls [4]).

Let us return to the pupils, to the question of how they are working, as well as to the question of what they are supposed to learn.

The boys are apparently working in accordance with the masculine myth, in a way which has been ascribed as equivalent to males. In accordance with this, the attention seems to be paid to the object, the rational dealing with this, and to the autonomous performance. They seem to care - to some extent - less for the other person, they express independence.

The girls are in a foreign land, the object they work with, seems alien to them. Math and technology are, within the societal universe of interpretations, seen as a male domain. And due to the gender-specific socialization, the girls tend to place priority on the relationship, being aware of the

other person, expressing dependence and subjectivity. Conceptualized differently, which also conveys a different meaning, the boys seem context unaware, whereas the girls seem context aware [5]).

True or false.

But what are the pupils supposed to learn? On the learning agenda are mainly two elements. One is to get acquainted with the machine: to learn how to start it up and close it down, to get to master the keyboard etc. This, as well as the basic commands, e.g. forward, right turn, left turn, is supposed to be acquired by following the instructions in the textbook [6]). And in most cases this seems to come really easily.

A pre-requisite for following the instructions is the ability to read, as well as to acquire fairly quickly, through the textbook samples, which the pupils execute on the computer, a certain amount of mathematical knowledge. Facts like a circle makes 360°, angles in a rectangle 90°, in an equilateral triangle 60° each. Apparently this does not create severe problems - as long as the instructions are to be reproduced step by step.

On the basis of this, the pupils are led on to applied instructions. They are expected to have acquired the knowledge, which enables them to create drawings. It is a reproduction which demands decomposing and reconstruction of the textbook drawings by backtracing, in order that a desired form (whether compulsory or optional) may be drawn. Already here it is clear that neither the basic commands nor the mathematical knowledge is incorporated in their understanding. However, though they did not always draw exactly what was planned, e.g. the roof of the house was askew, or the chimney out of proportion, most of them succeeded.

The third step is the programming, in which the pupils are expected to be capable of both drawing, and writing a program, which - when called - will execute the planned form.

The difference between drawing the form and writing the program created problems. Both genders had difficulties in understanding and dealing with the abstraction that they moved from "one book to another", that is from applied instructions to programming, because the screen, the keyboard, the hardware or the concrete things remained the same. A possible explanation may be their lack of experience with computers, and the programming language not always making sense, hence carrying no meaning to the pupils. It may also, however, have to do with the fact that understanding this requires a qualification: the ability to grasp and deal with the world within the frames of an abstract mental activity.

This brings us on to the question of the second element on the learning agenda. In order to write programs, one must follow the rules and principles of the given programming language, and work within the frames, defined by the technique itself. Programming means producing new connection in accordance with and by means of the rules and principles of logic.

The classical logic (Aristotelian) is the formulation of the logical rules for the deductive sciences. To verify or falsify, whether one's conclusions rest on following - in one's argumentation - the premises posed. This is true, also in the development of logic systems. It is a closed normative science, which tells us how we ought to draw conclusions. One has to move within a logical system of premises - and within this closed system can be decided, whether the solution is true or false.

The computers are both the connecting link and the offshot of the development in the deductive sciences, the result of the merging of technology and science.

In a sense, the computer is a child of mathematics. Constructed on the basis of the mathematical logic, the pure logic, and it can only process information within these frames. Information which is to be stored and processed in a computer must be systematized and structured according to the principles of the formal logic. And secondly, the infor-

mation must be defined precisely, no ambiguity. If the computer is to function, the concepts must not be diffuse, as they cannot be made the object of interpretations.

This also holds true for the language, which is used. No matter how much it is attempted to make programming language natural, it is an artificial language, which may be characterized as unambiguous, static and independent of context. Whereas natural language is characterized by its ambiguity, its relation to the concrete world, and its dependence of context, thus being dynamic.

To follow the rules of logic does not include confronting the premises, nor the solution with reality. In the sense, logical thinking becomes a pure theoretical activity, and the concrete experiences gained by laying hands on reality are irrelevant.

This is the important part to be learned by the pupils. Moreover, once acquired, the pupils are expected to be capable of using the method on new problems posed in the text, that is within the domain, in which it was learned, as well as to apply it in new domains.

The latter raises the question of transfer. We shall not deal with it here, but only point out that mechanically applying an acquired methodological approach in a new domain, is not necessarily an advantage. It may prevent the person from understanding the uniqueness of the object. It is imposing rules from above, maybe being blind, and as such it does not lead to creative thought processes. On the contrary, it may block them, thus preventing cognitive development.

To acquire the method and the ability to follow the rules and principles of the formal logic is the goal of the education. However, this seems far away from both girls and boys. Though the latter more often used (voiced) mathematical concepts - they clearly did not master the programming.

The tendency was that the pupils gave up trying to reach the defined goals. Not very many succeeded in writing a

program. When the exercise was optional, they tended to remain on the graphic side. This may be due to the elaborate forms, some of them desired to program. Yet even on the more simple programs, they tended to give up - just as they gave up, when drawing a planned form. Instead they let themselves be inspired by the graphics. A beautiful drawing became, or was from the very outset, more important than the exercise. The qualification required: the abstract logical thought process within the frames of the concept system in math, was not aquired.

Yet the pupils created elaborate patterns, and worked patiently and concentrated on these when on the graphic side. To explain their ability to work with the beautiful graphics and their fascination, we deal with one qualification more. It is not required within this math education, and it is a thought process, which goes beyond reproduction. It is creative production. We would define it as the ability to let oneself be seduced by the object, and its uniqueness in movement. In other words, not to impose rules, methods from above, but to let oneself be open to the material, one is working with. To let oneself feel the process and follow the feeling. In other words, producing by means of own perceptions, feelings etc., but of course within the limits posed by the technique. This is, in our opinion, what many of the pupils do, when they give up the programming, even leave a planned drawing, and let themselves be inspired by what is on the screen, moving from there. They let themselves be seduced by the magic and draw beautiful patterns.

The question, which seems essential to ask then, is: What is it, the pupils learn, and is the ability to master and follow the rules of the formal logic the same as logical thinking? Or to phrase it differently: How do human beings relate to the world, and what may be the fundamental ways of cognition?

Cognition.

Let us start with the question of logical thinking. In general use this very often refers to a person's ability to think by means of language, following certain formal rules. But logical thinking is much more than the mere mastering of symbols and logic. We know, understand and reason logically on the basis of much more than that which has been explicitly verbalized. The tacit dimension is an essential element in human cognizance, and as pointed out by Rubinstein (1976) any cognition starts with feelings and perceptions. This is also true in the case of thinking in terms of language and logic, and though it is a way of thinking which may seem far removed from tacit dimensions, it can never be detached from the essential kinestetic and emotional basis.

Logical thinking is - in this sense - the ability to draw conclusions which are in accordance with the given premises, whether they be represented by kinestetic information, emotions, symbols or experiences of other kind.

Logical thinking is - within this understanding - not the same as the ability to follow the rules of logic. The latter may be perceived as an ability to reach conclusions through a process of calculations. Or illustrated differently: A scientist may be very capable of following the rules of the formal normative logic. However, when he crosses the street, it may be with great danger - not only for himself, but also for the rest of us.

As a possible model for understanding the cognitive development and the gender-specific cognitive structures we operate in our paradigm with the following three fundamental ways of cognition: The kinestetic, the emotive and the symbolic. Though they are presented independently here, they must be considered as a whole. The development of - and interaction between - these, is the basis for the human cognition, and for the person's comprehension of a coherent world.

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The kinestetic way of cognition is based on sensory-motor activity. It is the body and the senses which are the basis,

and it is the individual's practical activities - it is by laying hands on reality - this qualification is developed. We may call it the common sense of the body.

Kinestetic cognition does not enjoy a high value in our culture. To a large extent it is demarcated as an essential basis and means for the cognitive development, and as such not given much space in the societal accepted universe of interpretations. Despite the fact that is the basis for, and maintains an essential role in the cognitive development throughout life. But due to its nature, and because this cognitive way - as a tendency - is excluded through the established social relations, it can only be expressed in very limited ways within the official symbolic frame (language). On the other hand it cannot be suppressed entirely, it continuously sticks out its head. This, however, being its force: it may demolish borders and be point of departure for transgressing activities.

The emotive way of cognition is based on the human interactions and is formed through the necessary emotional relationships, formed with other human beings, as well as to objects in the outside world. Though there is a difference in the emotional relation established to human beings and those established to objects.

For survival the human being depend on others. A newborn child (or an adult) cannot survive on its own. An interaction must be established in which not only the child's physical needs, but also its emotional needs, are met. The mother can only understand and meet the child's needs by orienting herself in a caretaking, emotional way towards the child. We may speak of the mother seducing the child into life, she herself - at the same time - being seduced by the child's uniqueness, and the emotions work as an orienting tool for the child's way of relating to the world.

The emotive way of cognition grows out of human relations. And it is the qualification through which the dissolution of borders between self and others is made possible. Thus the ability for caring identification with another living

being (nature also perceived as living) is made possible.

It is not a cognition which enjoys high status in our culture. Despite the fact that is the orienting means for the child's development and remains so also in adult life.

The symbolic cognition may be transformed through language, music, pictures, forms, colours etc. But here we shall only deal with language, as it is, in our society, the symbolic cognition which is given highest priority.

It is in the mother/child interaction (Lorenzer, A., 1974) that language is introduced. In the beginning language is - to the child - merely sounds, but gradually it becomes the naming of the different processes of interaction, in which the kinestetic and emotive dimension are embedded.

Through the use af language of words - in many different situation the sounds are differentiated, and gradually they are alotted a meaning, they become concepts. But not unicly defined concepts, because there are no sharp borders in every daylife, but blurred, and the meaning of the concept is derived from the context.

Language has a double function. It is a medium for communication, through which experiences, feelings, information etc. may be transmitted. In this sense, language is closely connected to human relations and human activities. On the other hand, language may become detached from the direct relation to interaction and action, and become an intellectual tool by means of which knowledge may be developed and transmitted, with no direct relation to experienced situations. In this sense, language may become a very powerful tool for the cognitive development. Through language it becomes possible to transgress the present to think about one's own thinking, even to build theories etc.

As such language is a tool for the intellect, and may become more or less abstract. Development of theories and scientific concepts may be an example of an abstract language, in which concepts are defined rather by their relation to other concepts than to the experienced reality. But even in scientific concepts language must refer to the reality, otherwise it

cannot become the means for explaining and grasping it's object.

The results of mental process must be confronted with reality, otherwise they may remain merely figments of the brain, text "sine con". Yet language may become demarcated from it's basis to the extent that it becomes a pure abstraction, and no body, no sense, nor human relations hold it. When it cannot be held, but is "sine con" and only text, it must be defined, and rules and principles must be made for the use of it. It is no longer language, but signs.

Math as well as computer language are examples of rule ridden artificial languages. They are abstract, as the scientific language may be, but each concept is isolated, uniquely defined and static, hence not referring to context, nor to emotions or experiences. This does not imply that they cannot be used as tools.

But let us return to human cognition. The cognitive development of the two genders may be understood within the frames of the three cognitive ways in this model. But due to the gender specific socialization the structure between these three will - as a tendency - be different for the two genders.

Gender specific socialization.

John Head (1983) has pointed out that the key concepts in describing the differences between girls and boys in our culture, is for the boys a development towards autonomy, and for the girls a development towards personal relations.

In the early socialization of the child, this is the general pattern in the western societies: Girls are females - born by females, raised in the homes as well as educated in the schools mostly by females, and are going to become females.

Through this pattern of socialization, the girl may identify herself with the adult in the primary relationship. This implies - as a main characteristic but of course not as an only - that the orientation of the girl - to a certain extent - is maintained towards the close emotional interaction. The symbiotic relation will make up an essential frame for the prac-

tical activity of the girl, hence for her acquisition, understanding and interpretation of the world. And through this the development and qualification of the ability for concern, hence the ability for dissolving borders between self and others is constituted.

If the girl does not encounter severe contradiction within this relationship, she may relatively simple integrate a feminine univers of interpretation. That is the cognitive development will be subordinated the orientation towards emotional relations, and the emotive way of cognition will play an essential role in her development.

In contrast to the girl, the early socialization of the boy seems more complicated. Boys are males, born by females, raised in the homes as well as educated in the schools mostly by females. But they must become males. This pattern of socialization implies that the boy cannot identify with the primary person, the models for identification must be found elsewhere, outside the primary relationship. In this process of socialization the boy must alter his orientation from the established emotive relationship towards the outer world, which will make up an essential frame for his practical activities, hence for his acquisition, understanding and interpretation of the world. And through this the ability for autonomy, for demarcation from others is constituted. The demarcation forces the boy so to speak -to develop an instrumental orientation towards the world, it becomes the mean by and through which his emotional needs may be met.

To the extent that part of his emotional readiness i successfully oriented towards the outer world, he may relatively simple integrate a masculine universe of interpretation. That is, the cognitive development will be subordinated the orientation outwards, and as a tendency his emotive cognitions will be subordinated his autonomy.

However, if the boy, in the process of reorientation, has to suppress the emotional readiness, he can only with difficulty establish other emotionally based human relations. And his orientation being instrumental, his emotional needs can only be met through his controlling and commanding the surroundings.

The gender specific socialization in our society has thus a tendency towards different orientations of cognition for the boys, respectively girls. The psychical energy of the girls will primarily be oriented towards close emotional relations, and this may lead to a certain dependence, at the same time to the development of capacity for concern.

The psychical energy of the boys, on the other hand, will primarily be oriented towards the outside world, and in the process of identification the boy is forced to establish some kind of demarcation from close emotional relationships and develop autonomy.

The consequence of this different orientation of girls as opposed to boys will be that they also develop different dimensions in their cognitive ways. Where girls are concerned, it is the emotive cognition which plays the essential part, and this may lead to a symbolic cognition, in which the living processes of human life are embedded, and thus an emotive cognition primarily oriented towards living beings rather than objects. The latter will be subordinated their relation to human life.

For the boys the emotive way of cognition will - as a tendency - be pushed more in the background. His development may lead to a symbolic way of cognition, in which the handling of the objectrelated world plays an essential role. And his instrumental orientation will also - as a tendency - be embedded in his symbolic and emotive way of cognition, and colour his relation to human life.

If we return to the extreme examples from the videotapes, this seems - to some extent - to be the picture, which emerges from the impressions. The girls primarily orient themselves towards each other, the human relation seems more essential to them than the object, they work with. They orient themselves emotionally towards each other, and their workstyle is collective, in the sense we have called: we-circle.

In their use of language they rely on open suggestions, which invite to further communication and to the strengthening of the emotional human interaction. As opposed to statements which close. In their communication mathematical concepts play only a minor role. It is signs with rules and principles for the use of it, not a language, in which the kinestetic and emotive dimensions are embedded. The girls' symbolic way of cognition will be embraced by the body, the senses and the emotions. Thus they stand - as a tendency - estranged in front of the mathematical concepts. This does not imply that the girls do not/ cannot learn math, but only that their symbolic way of cognition is not demarcated from emotional experiences and human life.

For the boys it seems as a tendency to be the other way around. The boys primarily orient themselves towards the object they work with, it becomes the mean, through which the human relation is established. Or rather, the boys relate to each other through the object, not directly. But it is a relation, in which the demarcation from "the other" plays an essential role. They do not cooperate, or rather, their cooperation and the relation are characterized by competitions. This finds its expression in the individual performance as well as in their verbal communications. It is not - mainly - characterized by open suggestions, but primarily by statements, which closes for a further development of communication, and to a certain extent it also closes for the emotional relationship. The mathematical concepts seem to play an essential role, but they are merely being used as a tool for demarcation. The boys'

behaviour seems instrumental, both in relation to the object as well as to the human - and this also shows itself in their symbolic way of cognition. The language has become a mean, an instrument, which can only poorly integrate the direct emotional dimensions.

This picture finds support in an investigation by Sjøberg & Lie (1983). Their investigation concerning gender specific attitudes towards physics showed that the girls developed negative feelings towards physics. The girls found that physics was neither relevant to themselves nor to the society. And when the relevance disappear, the meaning is lost too. The boys did - to a large extent - have the same feelings towards physics, but this did not seem to have much influence on them. They saw physics as a mean to reach certain goods, and theyrelated instrumentally to the subject.

When all this is said, we shall repeat, what was pointed out in the introductions. What has been presented here are the general impressions. Great individual differences among the girls, respectively boys, certainly show on the tapes - and an analysis of these is necessary. Also the theoretical paradigm presented we must insist is only a possible model for a tentative understanding of gender specific differencies. It is a model, from which we have drawn some dimension and left others untouched. This is an essential limitation. The reality and the human beings are much more manifold and complicated that what has been communicated here.

Notes:

1. For lack of a better expression, though we do not find that this concepts covers adequately what is the contents of their relationship.
2. The literature of Romantism may serve as an illustration of this.
3. We do not mean to imply that all women respectively all men understand the world within the feminine, respectively masculine universe of interpretations. The picture is not that simple, the dialectic poles coexist within each individual, but with a dominance depending on gender and socialization.
4. The findings of Lie and Sjøberg (1984) may be interpreted on this basis.
5. See Dale Spender: Man Made Language (198o), who has pointed to the fact that naming the world is not women's business, as well as shown the gender specific negative/positive connotations embedded in the naming.
6. See e.g. Bloch, Charlotte; Christrup, Henriette and Roepstorff, Lisbeth: Samfundet, skolen og eleverne - om sortering og bevidsthedsdannelse i folkeskolen. Rhodos, Copenhagen, 1978.

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ABSTRACT.

Emperical data consisting of videotapes of primary school girls/boys (age 14) working with Myresnak[+] in Math Education demonstrated gender specific differencies in cooperation and work style.

These differences may be explained in terms of a gender specific socialization in a gender divided society. Math, science and technology also viewed within the frames of this polarization.

On the basis of the goal for the subject taught: to master the rules and principles of the formal logic, a stepwise model for the learning process is introduced and discussed, leading to the question: What is it the pupils learn?

Rephrasing this to: What may be the fundamental ways of cognition, a developed theoretical paradigm covering the fundamental ways of cognition is presented. The described gender specific differencies are tentatively sought to be conceptualized and explained whitin this frame.

Also some essential limitations of the cognitive development possible in this education is pointed out.

+) may be described as a Danish variation of LOGO, developed especially for use in Math Education.